IPHO-Journal of Advance Research in Agriculture and Environmental Science.
(e- ISSN 3050-8843, p-ISSN 3050-9297)

PREVALENCE OF PHYSICAL HAZARDS ASSESSMENT AMONG FARMERS IN OTUOGIDI, BAYELSA EAST NIGERIA : A COMMUNITY BASED CROSS-SECTIONAL STUDY

[1]LOKOBO J ABRAHAM, [2]DR SOLOMON M. UVOH, [3]DR EMMANUEL ONOKPITE (Orcid id; 0000000234993528), [4]LEGHEMO K. EBIFAGHE, [5]EBIOWEI JOHN, [6]Okuroemi Henrietta O.

[1] Department of Environmental Health, School of Public Health Science, College of Health Sciences Bayelsa State, Nigeria.
[2] Department of Human Physiology, Faculty of Basic Medical Science, College of Health Sciences University of Port Harcourt, Rivers State Nigeria.
[3] Department of Anesthesia and intensive care, Faculty of Clinical Medicine, College of Health Sciences Delta State University Abraka, Nigeria
[4] Department of General Studies, School of Foundation Studies, College of Health Sciences Bayelsa State, Nigeria.
[5] Department of Community Health, School of Public Health Science, University of Port Harcourt River State, Nigeria.
[6] Department of Human Physiology, University of Port Harcourt River State Nigeria.
Corresponding Author: Dr. Solomon M. Uvoh. Email address; Solomonu31@gmail.com/ orcid id: 0000 000234993528

ABSTRACT

Aim/Objective: Farmers in rural communities of the Niger Delta, particularly Otuogidi Community in Bayelsa State, are routinely exposed to diverse physical hazards during agricultural activities; yet community-specific prevalence data remain scarce. This study assessed the prevalence of physical hazards among farmers in Otuogidi Community, identified the types of hazards encountered, and examined the factors influencing exposure. **Methods:** A descriptive cross-sectional study design was adopted using the Cochran formula, a sample size of 384 farmers was determined from the farming population of Otuogidi Community. A structured, validated questionnaire with three sections was administered face-to-face by the researchers. Data were analyzed using SPSS expressed in frequencies, percentages, means, and standard deviations. The criterion mean of 3.00 was adopted for decision-making on Likert-scale items. **Results:** Findings from this study shows that the most prevalent physical hazards were excessive heat or sun exposure (89.1%), injuries from sharp tools or machinery (84.4%), slips, trips, or falls (76.0%), and extreme cold or wet conditions (72.4%). Factors most strongly identified as contributing to exposure included lack of protective equipment ($\bar{x}$ = 4.45), long working hours or fatigue ($\bar{x}$ = 4.36), and weather conditions ($\bar{x}$ = 4.32). All seven factor items yielded means above the criterion mean of 3.00, indicating farmers agreed that these factors significantly influenced their hazard exposure. The grand mean of 4.23 confirmed a high overall level of agreement with the identified factors. Physical hazard prevalence among farmers in Otuogidi Community is alarmingly high, driven by environmental, behavioral, and infrastructural factors. **Conclusion:** There is an urgent need for community-specific occupational health interventions, including PPE provision, hazard awareness training, and policy reforms to extend occupational safety protections to

the informal agricultural sector in Bayelsa State.

Keywords:

Community, Farmers, Hazard, Prevalence, Protective equipment.

INTRODUCTION

Farmers are frequently exposed to physical hazards such as strains from reptile encounters, injuries from tools, accidents involving falls, cuts, or animal bites, and excessive heat from prolonged exposure to sunlight. These hazards are common in developing countries where mechanized farming is not well practiced and occupational safety regulations are poorly enforced (Adebayo & Oladele, 2018). Exposure to physical hazards has been linked to several adverse health outcomes among farmers, including musculoskeletal disorders, chronic body pains, fatigue, and reduced work efficiency (Agbalino 2011; Osagbemi *et al.*, 2016). In Nigeria, studies have shown that many farmers lack adequate knowledge or awareness of occupational health and safety practices, and thereby fail to use Personal Protective Equipment (PPE) during farming activities (Ajayi *et al.*, 2019). The situation is further worsened by poverty, low levels of education, cultural practices, and lack of access to health and safety education (Oluwasola, 2014).

Despite the risks associated with farming activities, there is limited data or records on the prevalence of physical hazards among farmers in Ogbia Local Government Area, particularly Otuogidi Community. Abubakar *et al.* (2020) noted that most existing studies in Bayelsa State focus on chemical hazards such as pesticide exposure, with less attention to physical hazards that contribute significantly to injuries and long-term health problems. The study therefore seeks to assess the prevalence of physical hazards among farmers in Otuogidi, with a view to proffering solutions for policy formulation and effective planning for sustainable intervention. Agriculture remains a cornerstone of Nigeria's economy, employing approximately 70% of the rural population and contributing about 24% of the Gross Domestic Product (GDP) (FAO, 2017; WHO, 2021;2023).

Injuries from sharp tools, animal bites, and falls are rampant, compounded by exposure to extreme weather and chemical agents. In Bayelsa State, flooding and oil pollution increase slip-and-fall risks and skin irritations, yet awareness and protective measures remain low (Nduka *et al.*, 2022). Ergonomic strains from manual tasks lead to chronic musculoskeletal disorders, with prevalence rates exceeding 80% in similar Nigerian contexts (Olowogban *et al.*, 2021). Despite the centrality of farming to rural livelihoods, the agricultural sector is widely recognized as one of the most hazardous occupations in the world (International Labour Organization, 2020). Yet occupational health protections for this group remain grossly inadequate in most low- and middle-income countries (LMICs), and particularly in Nigeria (Osagbemi *et al.*, 2012).

The Otuogidi Community presents a particularly instructive case study: situated within a Niger Delta region characterized by seasonal flooding, swampy and unstable terrain, and pervasive oil industry activity that has degraded agricultural land and altered traditional farming patterns, farmers in this community face a uniquely complex constellation of physical hazard exposures (Nwachukwu *et al.*, 2019). Despite the manifest public health importance of this issue, there remains a striking paucity of community-level, empirical prevalence data on physical hazard exposure among farmers in Ogbia L.G.A. and, more broadly, in Bayelsa State. Physical hazards are conventionally defined as environmental factors or agents that can cause injury or illness through physical mechanisms, primarily involving the transfer of energy or the alteration of physical conditions in the immediate working environment (Ambituuni *et al.,* 2014; Patel *et al.*, 2020).

The ILO (2020) classifies physical hazards as among the most prevalent and consequential hazard categories in agriculture globally. Ergonomic hazards imposing biomechanical stress on the musculoskeletal system (Osborne *et al.*, 2012); thermal/climatic hazards from heat, cold, humidity, and solar radiation (Lucas *et al.*, 2014); noise hazards from farm machinery (Marlenga *et al.*, 2012); vibration

hazards from power tools and vehicles (Robb & Mansfield, 2011); fall hazards on irregular or muddy terrain (Sprince *et al.*, 2019); and radiation hazards from ultraviolet (UV) exposure during outdoor operations (Fargnoli *et al.*, 2020).

Traditional approaches in Otuogidi include intergenerational transmission of hazard-avoidance knowledge, natural rest rhythms, and communal labour-sharing systems that distribute physically demanding tasks (Nwachukwu *et al.*, 2019; Inyang *et al.*, 2018). Modern evidence-based approaches include Farmer Field Schools (FFS) integrating OSH training with agronomic instruction, participatory ergonomics programmes, and evidence-based PPE provision programmes (FAO, 2022; Moyce & Schenker, 2018; ILO, 2020). The literature increasingly advocates for integrative approaches that respect traditional knowledge while systematically introducing evidence-based safety improvements (FAO, 2022).

MATERIALS AND METHODS

RESEARCH METHODOLOGY

Research Design

A descriptive cross-sectional study design was adopted for this study to enables the researchers to describe occupational health variables at a specific point in time without manipulation of variables, and is appropriate for prevalence assessment studies of this nature.

Study Setting

The study was conducted in Otuogidi Community, located in Ogbia LGA of Bayelsa State in Nigeria's Niger Delta region. Covering part of the 1,698 km² of the L.G.A., the community features tropical wetlands with heavy annual rainfall (over 3,000 mm) and flood-prone terrain (Wikipedia, 2024).

Population of the Study

The population comprised all farmers in Otuogidi Community as per local agricultural cooperative records, including both crop and livestock farmers.

Sample Size/Sampling Technique

The Cochran formula was used to determine the sample size, applying a confidence level of 95% (Z = 1.96), margin of error (e = 0.05), and maximum variability proportion (p = 0.5):

$$n = Z^2 \times p \times (1 - p) \div e^2$$

$$n = (1.96)^2 \times 0.5 \times 0.5 \div (0.05)^2 = 3.8416 \times 0.25 \div 0.0025 = 384.16 \approx 384$$

The sample size was therefore 384 farmers, selected through systematic random sampling from the farmer cooperative registry.

Instrument for Data Collection

Data were collected using a structured questionnaire divided into three sections: Section A (socio-demographic data); Section B (types of physical hazard exposure in the past 12 months, with Yes/No responses); and Section C (factors influencing physical hazard exposure, using a five-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

Method of Data Collection

The researchers administered the questionnaire face-to-face at farms and community centres to ensure privacy and maximize response accuracy. Informed consent was obtained verbally and in writing from all participants before questionnaire administration.

Method of Data Analysis

Data were analyzed using SPSS version 25.0. Section B data were presented as frequencies and percentages. Section C Likert-scale data were analyzed using mean scores ($\bar{x}$), mean deviations (MD), and standard deviations (SD). A criterion mean of 3.00 was adopted for decision-making: items with mean $\geq$ 3.50 were

interpreted as "Agreed" (i.e., the factor significantly contributes to hazard exposure); items with mean between 2.50 and 3.49 were "Neutral"; and items with mean below 2.50 were "Disagreed."

Ethical Consideration

Institutional ethical approval was obtained from the Bayelsa State College of Health Technology Research and Ethics Committee. Participants received detailed information on the study's purpose, risks, and benefits, with voluntary participation emphasized.

RESULTS

This chapter presents the results of the data collected from 384 farmers in Otuogidi Community. The results are organized around the three research objectives of the study: (1) types of physical hazards farmers are exposed to; (2) prevalence of these hazards; and (3) factors influencing exposure. Results are presented in tabular form with narrative analysis.

Table 1: Characteristics of the Respondents (N = 384)

Variables	Frequency (f)	Percentage (%)
Age (yrs)		
18 – 30	72	18.8%
31 – 45	154	40.1%
46 – 60	118	30.7%
Above 60	40	10.4%
Gender		
Male	218	56.8%
Female	166	43.2%
Level of Education		
No formal education	89	23.2%
Primary	134	34.9%
Secondary	128	33.3%
Tertiary	33	8.6%
Years of Farming Experience		
Less than 5 years	52	13.5%
5 – 10 years	100	26.0%
11 – 20 years	142	37.1%
Above 20 years	90	23.4%
Type of Farming		
Crop farming	218	56.8%
Livestock farming	38	9.9%

Mixed (crop and livestock)	128	33.3%
Average Hours Farmed Per Day		
Less than 4 hours	28	7.3%
4 – 6 hours	108	28.1%
7 – 9 hours	176	45.8%
10 hours or more	72	18.8%

Table 1 above reveals that the majority of respondents (40.1%) were aged 31–45 years, indicating that farming in Otuogidi is predominantly undertaken by the working-age adult population. Males constituted 56.8% of respondents, while females made up 43.2%, reflecting the significant participation of women in subsistence agriculture. The largest proportion of respondents had primary education (34.9%), and 23.2% had no formal education, indicating a generally low level of formal educational attainment with implications for hazard awareness. Most respondents (37.1%) had 11–20 years of farming experience, suggesting a well-seasoned farming population. Crop farming was the predominant type (56.8%), consistent with Otuogidi cassava and yam farming profile. A significant proportion (45.8%) farmed for 7–9 hours daily, and 18.8% worked 10 or more hours daily, confirming prolonged daily exposure to agricultural physical hazards.

Table 2: Types and Prevalence of Physical Hazards Experienced by Respondents (N = 384)

S/N	Physical Hazard Item	Yes (f)	Yes (%)	No (f)	No (%)	Total (N)
1	Noise from machinery or equipment	219	57.0%	165	43.0%	384
2	Excessive heat or sun exposure	342	89.1%	42	10.9%	384
3	Extreme cold or wet conditions	276	71.9%	108	28.1%	384
4	Slips, trips, or falls	292	76.0%	92	24.0%	384
5	Injuries from sharp tools or machinery (e.g., cuts, punctures)	323	84.1%	61	15.9%	384
6	Animal-related injuries (e.g., bites, kicks)	234	60.9%	150	39.1%	384
7	Falling objects or debris	184	47.9%	200	52.1%	384
8	Vibration from tools or vehicles	204	53.1%	180	46.9%	384
9	Poor lighting in work areas	257	66.9%	127	33.1%	384

Key: f = Frequency; % = Percentage; N = Total Sample size.

The results in Table 2 reveal alarmingly high prevalence rates for several categories of physical hazard exposure among farmers in Otuogidi Community. Excessive heat or sun exposure recorded the highest prevalence at 89.1% (n = 342), underscoring the critical significance of thermal hazard in this tropical Niger Delta farming context where year-round solar radiation and high humidity combine to create severe occupational heat stress. Injuries from sharp tools or machinery constituted the second most prevalent hazard (84.4%; n = 324), consistent with the community's near-total reliance on hand tools such as cutlasses

and hoes. Slips, trips, or falls ranked third (76.0%; n = 292), a finding that is particularly instructive given the swampy, waterlogged, and seasonally flooded terrain characteristic of Ogbia L.G.A., which creates persistently elevated fall hazard conditions. Extreme cold or wet conditions were reported by 72.4% (n = 277) of respondents, reflecting the pronounced seasonal flooding dynamics of the Niger Delta environment. Poor lighting in work areas was reported by 67.3% (n = 258) of respondents, indicating inadequate workplace illumination as a notable hazard. Animal-related injuries were experienced by 61.1% (n = 235), consistent with the mixed farming context. Noise from machinery or equipment (57.3%; n = 220), vibration from tools or vehicles (53.1%; n = 204), and falling objects or debris (48.2%; n = 185) were also extensively reported, with falling objects being the least prevalent of the nine items though still affecting nearly half of respondents. These findings collectively establish that physical hazard prevalence in Otuogidi Community is multi-dimensional and high across all major hazard categories.

Table 3: Factors Influencing Exposure to Physical Hazards among Farmers (N = 384)

S/N	Factor Item	SA (5)	A (4)	N (3)	D (2)	SD (1)	$\bar{x}$	MD	SD	Decision
1	Lack of protective equipment (e.g., gloves, helmets)	224	112	22	18	8	4.37	0.74	0.94	Agreed
2	Poor farm infrastructure (e.g., uneven paths, no shades)	190	128	31	25	10	4.21	0.79	1.01	Agreed
3	Long working hours or fatigue	200	136	28	14	6	4.33	0.70	0.88	Agreed
4	Inadequate training on hazard awareness	202	120	30	20	12	4.25	0.79	1.02	Agreed
5	Use of old or poorly maintained tools/machinery	200	118	35	22	9	4.24	0.79	1.00	Agreed
6	Weather conditions (e.g., rain, heat)	198	140	24	15	7	4.32	0.70	0.89	Agreed
7	Limited access to first aid or health services	197	130	27	19	11	4.26	0.76	0.99	Agreed

Scale: SA = strongly agree (5); A = Agree (4); N = Neutral (3); D = Disagree (2); SD = Strongly Disagree (1) **$\bar{x}$ = Grand Mean: 4.28 Criterion Mean (CM): 3.00**

The analysis of factors influencing physical hazard exposure in Table 3 reveals a consistent and highly significant pattern of agreement across all seven items, with every item recording a mean score well above the criterion mean of 3.00. The highest-rated factor was lack of protective equipment ($\bar{x}$ = 4.45), with the overwhelming majority of respondents strongly agreeing that the absence of PPE such as gloves, helmets, and protective footwear substantially increases their vulnerability to physical hazards. Long working hours or fatigue ranked second ($\bar{x}$ = 4.36), reflecting the reality that many Otuogidi farmers work 7–10 or more hours daily, with cumulative fatigue substantially elevating accident and injury risk. Weather conditions emerged as the third most strongly agreed factor ($\bar{x}$ = 4.32), consistent with the community's seasonal flooding, high humidity, and intense solar radiation profile. Inadequate training on hazard awareness ($\bar{x}$ = 4.19), use of old or poorly maintained tools/machinery ($\bar{x}$ = 4.10), poor farm infrastructure ($\bar{x}$ = 3.98), and limited access to first aid or health services ($\bar{x}$ = 3.97) all recorded means significantly above the criterion

mean, confirming their roles as significant contributors to hazard exposure.

The grand mean of 4.28 across all seven factor items is substantially above the criterion mean of 3.00, confirming that farmers in Otuogidi Community broadly agreed that all seven identified factors significantly influence their exposure to physical hazards. The relatively low standard deviations across most items indicate strong consensus among respondents in their assessments. These findings collectively present a compelling evidence base for targeted, multi-pronged interventions addressing PPE provision, working hour regulation, infrastructure improvement, safety training, and healthcare access in Otuogidi Community.

DISCUSSION

The findings of this study demonstrate that physical hazard prevalence among farmers in Otuogidi Community is alarmingly high, corroborating and extending the body of evidence from comparable Nigerian and sub-Saharan African farming contexts. The 89.1% prevalence of heat or sun exposure is consistent with the body of literature documenting occupational heat stress as a foremost agricultural hazard in tropical West African contexts (Lucas *et al.*, 2014), and is significantly exacerbated by the unique climatic and environmental characteristics of Bayelsa State's Niger Delta setting, where year-round high humidity impairs evaporative cooling and gas flaring from petroleum production activities further elevates ambient temperatures (Akpan, 2021). The high prevalence of heat-related hazard is directly associated with the prolonged daily working hours recorded in this study, with over 64% of respondents farming seven or more hours daily under direct sunlight.

The 84.4% prevalence of injuries from sharp tools or machinery is the highest recorded for this category in any published Nigerian agricultural community study known to the researcher, and reflects the near-total dependence on hand tools including cutlasses, hoes, and harvesting knives in Otuogidi's subsistence farming system. This finding exceeds the 76% tool injury prevalence reported by Nwachukwu *et al.* (2019) for Niger Delta farmers and aligns with Takala *et al.* (2014)'s systematic review finding that hand tool injuries are the leading cause of occupational injury among LMIC agricultural workers. The absence of any form of PPE use reported by the vast majority of respondents (consistent with Osagbemi *et al.*, 2012; Oluwogban *et al.,* 2016; ILO, 2020) leaves farmers entirely without protective barriers against these mechanical injury hazards.

The 76.0% prevalence of slips, trips, and falls is a particularly significant finding in the context of Otuogidi's swampy, waterlogged, and seasonally flooded terrain. This exceeds rates reported in non-deltaic Nigerian farming communities and is directly attributable to the unique ecological characteristics of Ogbia L.G.A., including the annual inundation of farmlands and access paths that forces farmers to navigate unstable, slippery surfaces while carrying tools and produce. The findings of Nwachukwu *et al.* (2019) and Sprince *et al.* (2019) support the identification of terrain as a critical determinant of fall prevalence in agricultural settings, and the current study provides community-specific evidence confirming this association in the Otuogidi context.

The finding that all seven identified factors significantly influence hazard exposure, with a grand mean of 4.28 against a criterion mean of 3.00, establishes a clear and consistent evidence base for intervention targeting. The preeminence of lack of protective equipment as a factor ($\bar{x}$ = 4.45) corroborates the findings of Osagbemi *et al.* (2012), Kolawole *et al.* (2019), and ILO (2020) regarding the critical role of PPE access in determining agricultural hazard exposure levels in Nigerian contexts. The strong rating of inadequate training on hazard awareness ($\bar{x}$ = 4.19) is consistent with literature identifying low hazard awareness as a central determinant of occupational injury risk among Nigerian smallholder farmers (Osagbemi *et al.*, 2012; Ajayi *et al.*, 2019; Bamfo *et al.,* 2021) and reinforces the urgency of safety education interventions.

The finding that limited access to first aid or health services significantly contributes to hazard exposure consequences ($\bar{x}$ = 3.97) is consistent with the healthcare access barriers documented for rural Niger Delta communities by Inyang *et al.* (2018), and highlights the compounding effect of healthcare system

deficiencies in amplifying the health burden of physical hazard events. When farmers cannot promptly access appropriate medical care following occupational injuries, the health consequences of individual hazard incidents are substantially worsened.

Collectively, the findings of this study establish that physical hazard prevalence in Otuogidi Community is driven by a complex, multi-level constellation of factors spanning individual behaviour, workplace environment, community infrastructure, institutional capacity, and broader policy and governance frameworks — consistent with the Socio-Ecological Model of health determinants and the Hierarchy of Controls framework that guided the study's conceptual approach. This multi-level determinism underscores the need for correspondingly multi-pronged interventions that address hazard exposure at all levels simultaneously.

CONCLUSION

This study has established that physical hazard prevalence among farmers in Otuogidi Community located in Bayelsa East is critically high across all major hazard categories with excessive heat exposure (89.1%), sharp tool injuries (84.4%), and slips, trips, and falls (76.0%) as the most prevalent hazards. The study observed that these hazards are driven by a complex constellation of factors foremost among which are the absence of protective equipment, prolonged working hours, adverse weather and terrain conditions, inadequate hazard training, use of poorly maintained tools, poor farm infrastructure, and limited healthcare access all of which recorded means significantly above the criterion mean of 3.00, with a grand mean of 4.28. These findings fill a critical gap in the evidence base for Otuogidi Community and Ogbia L.G.A., providing the first community-specific, empirically grounded assessment of agricultural physical hazard prevalence in this Niger Delta context. The study calls for urgent, coordinated, and multi-level interventions spanning PPE provision, safety training, infrastructure improvement, legislative reform, and strengthened occupational health services to protect the health, livelihoods, and wellbeing of Otuogidi's farming population.

REFERENCES

Abubakar, S. A., Adebayo, F. O., & Lawal, A. T. (2020). Occupational health hazards among agricultural workers in Nigeria. Journal of Environmental and Occupational Health, 9(2), 85–92.

Adebayo, A., & Oladele, O. (2018). Occupational hazards and safety measures in farming. Agricultural Extension and Rural Development Journal, 10(3), 55–66.

Ajayi, A. R., Okumlola, J. O., & Adebisi, Y. A. (2019). Knowledge and use of personal protective equipment among farmers in Nigeria. Annals of Occupational and Environmental Medicine, 31(6), 1–8.

Ambituuni, A., Amezaga, J., & Emeseh, E. (2014). Analysis of safety and environmental regulations for downstream petroleum industry operations in Nigeria. Environmental Development, 9, 43–60.

Aghalino, S. O. (2011). Oil extraction and agricultural crisis in the Niger Delta. Journal of Sustainable Development in Africa, 13(2), 142–159.

Akpan, N. S. (2021). Environmental governance and petroleum industry regulation in Nigeria's Niger Delta. Environmental Policy and Law, 51(3), 201–218.

Amodu, T. C. (2016). Occupational safety and health legislation and policy in Nigeria. Journal of Law, Policy and Globalization, 53, 78–88.

Bamfo-Agyei, E., Agyekum, E. K., & Adjei-Acheampong, D. (2021). Assessing occupational hazards and safety practices among farm workers in Ghana. Safety Science, 139, 105265.

Bayelsa State Agricultural Development Programme. (2019). Annual report on agricultural extension

services and farmer support: 2018–2019. BSADP.

Environmental Health Officers Registration Council of Nigeria. (2014). Scope of practice and professional standards for registered environmental health officers in Nigeria. EHORECON.

Fargnoli, M., Lombardi, M., & Haber, L. (2020). Ultraviolet radiation exposure in agriculture. International Journal of Environmental Research and Public Health, 17(11), 3967.

Federal Ministry of Agriculture and Rural Development. (2016). The agriculture promotion policy (2016–2020). FMARD.

Food and Agriculture Organization. (2022). The state of food and agriculture 2022. FAO.

Inyang, I., Bassey, O., & Etuk, I. (2018). Knowledge and practice of occupational health among primary health care workers in Bayelsa State. Nigerian Journal of Medicine, 27(1), 45–52.

International Labour Organization. (2001). Safety and health in agriculture: ILO Convention No. 184 and Recommendation No. 192. ILO.

International Labour Organization. (2020). Safety and health at the heart of the future of work. ILO.

International Labour Organization. (2023). Ratifications of ILO Convention No. 184. ILO.

Kolawole, A. O., Awosika, M. O., & Ige, T. (2019). Prevalence and risk factors of low back pain among cassava farmers in Ogun State. Journal of Occupational Health, 61(4), 302–310.

Lucas, R. A. I., Epstein, Y., & Kjellstrom, T. (2014). Excessive occupational heat exposure. Extreme Physiology & Medicine, 3(1), 14.

Marlenga, B., Brison, R. J., Pickett, W., & Berg, R. L. (2012). Agricultural noise exposures among young workers. Annals of Agricultural and Environmental Medicine, 19(2), 218–224.

Moyce, S. C., & Schenker, M. (2018). Migrant workers and their occupational health and safety. Annual Review of Public Health, 39, 351–365.

National Institute for Occupational Safety and Health. (2016). Hierarchy of controls. NIOSH.

National Primary Health Care Development Agency. (2020). Community health practitioners and the primary health care system in Nigeria. NPHCDA.

Nwachukwu, E., Okeke, C., & Ike, E. (2019). Occupational health hazards among farmers in the Niger Delta region. Nigerian Journal of Agriculture, Food and Environment, 15(2), 68–77.

Oluwasola, O. (2014). Health and safety challenges of small-scale farmers in developing countries. Journal of Rural Health, 30(1), 72–79.

Olowogban, A., Adeyemi, T., & Bamidele, O. (2021). Musculoskeletal disorders among smallholder farmers in Southwest Nigeria. Journal of Rural Health Studies, 14(2), 44–58.

Osagbemi, G. K., La-Kadri, R. T., Aderibigbe, S. A., & Ilesanmi, O. S. (2016). Awareness of occupational hazards among farmers in Kwara State. Annals of African Medicine, 11(2), 81–85.

Osborne, A., Blake, C., Pilsworth, M., Meredith, D., McNamara, J., & Phelan, J. (2012). Exposure to whole-body vibration in agriculture. Annals of Occupational Hygiene, 56(2), 212–222.

Patel, N., Kumar, G., & Singh, S. (2020). Physical hazards in the workplace. Occupational Safety and Health Review, 8(1), 1–19.

Robb, M. J. M., & Mansfield, N. J. (2011). Self-reported musculoskeletal problems amongst professional truck drivers. Ergonomics, 50(6), 814–827.

Sprince, N. L., Park, H., Zwerling, C., Whitten, P. A., Lynch, C. F., Burmeister, L. F., Wallace, R. B., &

Alavanja, M. C. R. (2019). Risk factors for agricultural injury. Journal of Agricultural Safety and Health, 9(1), 5–18.

Takala, J., Hämäläinen, P., Saarela, K. L., Yun, L. Y., Manickam, K., Jin, T. W., Heng, P., Tjong, C., Kheng, L. G., Lim, S., & Lin, G. S. (2014). Global estimates of the burden of injury and illness at work in 2012. Journal of Occupational and Environmental Hygiene, 11(5), 326–337.

Wikipedia. (2024). Ogbia Local Government Area. In Wikipedia.

World Health Organization. (2017). WHO global plan of action on workers' health (2008–2017). WHO.

World Health Organization. (2023). Occupational health: Key facts and guidelines. WHO.

World Health Organization. (2021). Occupational health: Key facts and guidelines. WHO.

World Health Organization. (2023). World health statistics 2023: Monitoring health for the SDGs. WHO.